

TEACHING COMPUTERS TODAY

Minidac 6010, one of a coordinated group of training aids that lets you teach basics of digital computers with new, efficiency and economy.

- *Why you should introduce your students to digital computers.*
- *How you can do it easily and efficiently.*
- *Our complete NDEA-approved educational package for teaching computer basics—how it makes the job easier for you, more rewarding for your students, and far less expensive.*

A space capsule heads for the moon. A factory turns out automobile engines with scarcely a worker in sight. A bank processes millions of checks daily, with remarkable accuracy, using only a handful of clerks. A man's heart condition is diagnosed by a surgeon hundreds of miles away — in just fifteen seconds.

Behind each of these current-day achievements — and countless more — is a modern electronic digital computer.

"When the history of our age is written," said Ralph Cordiner, former president of General Electric, "I think it will record three profoundly important technological developments: nuclear energy, automation, and computers, which multiply man's ability to do mental work . . . Of these three, the computer will bring the greatest benefit to man."

The computer will make offices and factories far more efficient, greatly boost productivity per person, and thus increase general prosperity.

NEW KNOWLEDGE FRONTIERS

The computer will allow public officials and businessmen to make sounder decisions — and permit scientists to open new knowledge frontiers and make new discoveries — using data which otherwise would not be available, because it would take too long and cost too much to obtain.

And the computer will provide new occupational opportuni-

ties for millions. Already, with the mushrooming use of computers, a tremendous demand has developed for trained people. It has been estimated that some three million persons will be employed in the computer industry by 1970.

And so it's understandable that more and more educational authorities agree that *all* students should be given at least a basic introduction to the digital computer — what it is and how it operates.

It is generally recognized that the responsibility for providing this basic computer education rests with the educational institutions: the secondary schools, colleges and universities. And it is increasingly acknowledged that this education must *begin* at the high school level.

THREE MAIN AREAS

Essentially, basic computer education falls into three areas:

1. *General education to provide a basic introduction and background in computer science for all students, who will be increasingly influenced by computers throughout their lives.*
2. *Education of specialists in fields other than computer science (in business, industry, government, science, etc.) who will use computers as a tool in their special fields.*
3. *Education of computer science specialists, who will be employed directly in the computer field.*

- The indispensable basic concepts that apply to all computers.
- The instructional materials and training aids you need to do the teaching job easily and efficiently, regardless of your present knowledge of computers.
- How you can integrate computer instruction into any program, with or without a separate course.
- Scientific Educational Products Corporation's complete educational package, the most efficient and economical on the market: choice of two *logic trainers* — *Minidac 6010* at \$285 and *Nordac II* at \$550, and a remarkable *programming trainer* — *Minidac 201* at only \$16, each with self-instructional manuals.

As with other disciplines, early education in Computer Science for all students — whether in a mathematics, science, electronics or business course — should emphasize *basic concepts and principles*, those which apply to *all* digital computers.

This emphasis is brought out in texts already written and in curricula already developed by various educational organizations and associations, such as the National Science Teachers Association, the Association for Computing Machinery, the U.S. Office of Education, and many others.

THE BASIC CONCEPTS

Important among these basic concepts and principles are the study of Logic (the digital computer is essentially a "logic machine"), Boolean Algebra, Binary Arithmetic (and their applications to computer operations), Computer Organization and Basic Computer Programming.

To teach these basic concepts in the easiest, most efficient way, what is needed is a complete "educational package" with instructional equipment flexible enough for use either in a course devoted solely to computers, or for integration of computer instruction into an existing course covering a broader range of subject matter, such as mathematics or business education.

Since the computer is in fact a *machine*, some kind of machine (or physical equipment) is needed to teach exactly how it works. What is the ideal kind of training equipment?

One might assume, a computer itself!

But an actual computer is not a practical training device. It is far too expensive. And its tremendous speeds, vast memory and complex input-output make it inept as an instructional tool.

The ideal teaching equipment performs all computer functions simply and slowly, so students can readily grasp them. This equipment must also be rugged and economical, to allow widespread student use.

EFFICIENT, ECONOMICAL INSTRUCTION

Fortunately, there now exists, for the first time, a coordinated group of teaching equipment specifically designed to introduce and teach the basic computer concepts in the most efficient way possible — *and at a cost within reach of all educational institutions.*

This coordinated group of teaching equipment — developed, produced and offered by Scientific Educational Products Corporation — comes complete with self-instructional manuals and includes everything you need to provide students with a proper and thorough introduction to the basic computer concepts, both by classroom demonstration and student laboratory use.

Students begin with the most easily-grasped concepts, which are gradually combined to lead to comprehension of complex computer functions. Our training equipment performs all computer functions, lets every student *learn by doing* — see and understand the sequence of operations which computers follow in the logical solution of problems.

And because our equipment is lowest priced, you can afford more units, and thus give more students invaluable "hands on" experience.

Thus, this complete educational package — of trainers and manuals — takes student (and teacher) step by step into the fascinating world of computers, providing in the easiest, most efficient way a sound background in the basic principles of Logic, Boolean Algebra, Binary Arithmetic, their application to computer functions and Computer Organization and Programming.

COMPUTER LOGIC TRAINERS

To properly teach Logic, Boolean Algebra, Binary Arithmetic and their relationship to computer operations, a digital computer *logic trainer* is needed.

Scientific Educational Products offers two such logic trainers — *Minidac 6010* and *Nordac II* — both specifically designed to teach these concepts by *performing* them so the student can see them in operation.

Minidac 6010 (formerly known as *Minivac*) is a switching circuit logic trainer: it uses switches and relays to perform computer functions. Students program and operate *Minidac* to teach themselves all basic computer operations.

Chosen for over 1500 computer education programs, *Minidac* is the most widely used and successful computer trainer of its kind. With its accompanying manuals, *Minidac 6010* is a self-instructional computer educational package. Fully assembled, it is ready for your students to use for only \$285.00.

Nordac II is a fully transistorized (solid state) computer logic trainer that uses the same logic building blocks found in full-scale computers.

With this highly advanced (but surprisingly low cost) training aid, the student performs computer functions slowly, clearly and visually, and thus readily grasps the relationship of Logic and Boolean Algebra to Computer Arithmetic, Data Moving, Decision Making and Control functions.

With a complete set of AND/NAND, OR/NOR, FLIP-FLOP and ADDER/SUBTRACTOR modules, *Nordac II* is ready to perform and teach all basic computer functions for only \$550.00.

COMPUTER PROGRAMMING TRAINER

To properly teach Basic Computer Organization and Programming, a digital computer *programming trainer* is needed.

Minidac 201 is such a programming trainer. This remarkably ingenious, low priced training aid is a simulated digital computer containing all the component parts — input, output, storage, instruction register, instruction counter and accumulator — of a full-scale computer.

With it the student plays an active role in controlling and performing the sequence of operations that make up a program. The student learns the basic stored program concept, writes programs and then runs them on *Minidac 201* to carry out the solution of the problems he has programmed. It's for use by *every* student in classroom, library, study hall or home and is priced at only \$16.00.

COMPLETE EDUCATIONAL PACKAGE

Scientific Educational Products Corporation provides this group of computer trainers to help the teacher give every student a complete introduction to digital computers in the easiest, most efficient, most economical way possible.

Our unique NDEA-approved, educational package offers you and your school these five important advantages:

1. It performs basic computer functions and operations simply and slowly, so all students can fully understand them.
2. It is accompanied by complete self-instructional manuals requiring no prior knowledge, so the study of computers can be easily integrated into

any program, in any department, at all levels from junior high school through college.

3. It takes the student through a complete study of the basic concepts and principles of digital computers step by step.
4. It is specifically designed for most effective learning via classroom demonstration and student operation.
5. It is relatively inexpensive, the lowest-priced educational package available. Thus it is within

the budget of all schools and allows more students to benefit from "hands on" experience.

Where do you obtain these training aids?

They are available only from:

**Scientific Educational Products Corporation,
30 East 42nd Street, New York, N. Y., 10017.**

CHECK THESE CHARTS

See which Computer Training Aids Are Best For You and Your School.

COMPUTER LOGIC TRAINERS (Minidac 6010 and Nordac II compared with other digital computer logic trainers)

	MINIDAC 6010	NORDAC II	D	H	L	P	C
What components are used to perform computer functions?	Relays and switches	Solid state	Solid state	Solid state	Solid state	Solid state	Solid state
Are the computer logic circuits pre-wired?	No. Logic circuits are programmed as needed.	Yes	Yes	Yes	Yes	Partially pre-wired	Yes
Can student easily see logic diagram for function being performed?	Must be traced by the student	Yes	Must be traced by the student	Must be traced by the student	Must be traced by the student	Yes	Yes
Does it come with a full Adder/Subtractor?	No	Yes	No	No	No	No	Adder only
Can it teach logic circuits?	Yes — switching circuits	Yes, with accessory circuit-trainer module (\$65.00)	No	Yes	No	No	No
How good is it for individual student use?	Excellent	Excellent	Adequate	Adequate	Adequate	Adequate	Adequate
How good is it for classroom demonstration?	Good	Excellent	Cannot see logic diagram	Cannot see logic diagram	Cannot see logic diagram	Excellent	Excellent
How many demonstrations are in the manual?	Over 200	85	About 40	25	30	About 50	About 40
How much does it cost?	\$285	\$550	\$895	\$1195	About \$700	\$1695	Over \$3000

Note that Minidac 6010 is excellent for student use, good for classroom demonstration — and the least expensive computer logic trainer on the market.

Observe that Nordac II offers every feature of every other logic trainer — even important features found only in the most expensive trainers costing several times as much.

COMPUTER PROGRAMMING TRAINERS (Minidac 201 compared with other digital computer programming trainers)

	Minidac 201	S	D	A
How large is the memory?	100 words	64 words	30 words	5 data words and 100 instructions
How many digits in each word?	4 decimal	21 binary	6 binary	4 binary
How many instructions in its repertoire?	15	8	8	10
Are instruction codes decoded automatically?	Yes	Yes	Yes	Yes
Does it have an accumulator that actually operates?	Yes	No	No	Yes
Does it have a shift register?	Yes	No	No	Yes
Is it designed for students to learn programming by using it?	Yes	Yes	Yes	Yes
Can each student have one to work with — anywhere at any time?	Yes	No	No	No
How much does it cost?	\$16	\$295	\$195	\$395

Note that Minidac 201 offers every feature of every other programming trainer — plus greater memory and more instructions — yet costs only a fraction as much.



The most widely used, most successful computer trainer of its kind.

This easy-to-operate switching circuit logic trainer is designed to teach — through classroom demonstration and especially through student use — Logic, Boolean Algebra, Binary Arithmetic and their relationship to computer operations. It's a self-instructional teaching package that comes complete with eight manuals . . . and the lowest price tag on any logic trainer: \$285.00.

Today Minidac 6010 (formerly known as Minivac 6010) is the most successful computer trainer of its kind in the world. More than 1500 secondary schools and colleges are using Minidac in mathematics, engineering, business education, technical and vocational programs and in computer clubs.

Why such popularity?

Part of the answer, obviously, lies in Minidac's price. At \$285.00 it is far and away the lowest-priced digital computer logic trainer on the market.

But by and large, schools and colleges today *can afford* more expensive training equipment. The fact remains that Minidac is a quality product specially designed as a teaching device, and exceptionally effective in actually demonstrating the principles and operations of digital computers.

Together with its eight fully-illustrated manuals (which present a complete self-instructional study program) Minidac 6010 does an outstanding job of bringing students a fundamental understanding of the mathematical and logical concepts underlying today's computers and their applications in science and industry.

Thus many educators choose Minidac 6010 completely apart from price. As one leading school superintendent put it, "The Minidac 6010 is the best teaching device I have seen for an understanding of the construction and functions of a digital computer."

Now, exactly what is Minidac 6010? A switching circuit basic logic trainer using switches and relays. When interconnected with program wires to perform basic computer functions, Minidac allows the student to actually see how the arrangement of components results in the function being performed and demonstrated.

And just what does Minidac do? It duplicates hundreds of basic computer functions and shows — by doing — how com-

puters use logic to make decisions. It adds, subtracts, multiplies, divides, illustrates number theory and solves illustrative mathematical problems.

It teaches Logic, Boolean Algebra, Binary Arithmetic and their applications to computers. It illustrates computer design, circuitry and programming, and demonstrates computer applications in business, science, industry, government, the military and everyday life. It even plays computer games. And teaches the potentialities (and limitations) of modern computer technology.

What kind of manuals come with Minidac 6010? They were developed over a course of years in consultation with faculty and staff members of M.I.T. and Harvard University. They are lucidly written and presuppose no special knowledge of mathematics, science or electronics.

The student begins with easily understood concepts. These are gradually synthesized to lead to an understanding of complex computer functions. All the while, the student programs Minidac to perform the functions under study; virtually every page of text is reinforced with experiments utilizing Minidac. Over 200 demonstrations are presented.

What about special Minidac curricula? These are also available, to assist the teacher in developing complete computer education courses or orientation sessions within established programs. The curricula include sequential lesson plans, demonstrations, experiments and suggested reading assignments.

Being used both as a demonstration and student experimentation device, Minidac comes fully assembled, is portable and easy to handle and operate. Its professional components are designed for intensive use. Students may be given direct access to the machine without fear of damage to expensive equipment. Programs set up on the Minidac console can be changed in minutes, enabling students to examine various computer operations in a single class period.

WHAT EDUCATORS SAY ABOUT MINIDAC

"The Minidac 6010 is the best teaching device I have seen for an understanding of the construction and functions of a digital computer. It embodies in a relatively simple device the basic units of input, processing, storage and output. The student who gets a fundamental knowledge of these functions is ready to go on to an understanding of commercial computers.

"The manuals, too, are unusually good.

"I would judge that every classroom in the nation which teaches electronics or advanced courses in mathematics would find the Minidac extremely useful as a demonstration aid."

David G. Salten
Superintendent of Schools
New Rochelle, New York

"You will want to see Minidac in operation, as we did. It makes the complex seem so simple, and it goes far toward relieving the inferior feeling that we have always had in the presence of the giant computers which do such fantastic things . . .

"Minidac should be available in every business education department . . ."

Bulletin —
Foundation For Business Education

"Our demonstrations create spontaneous enthusiasm among school administrators. Each, in turn, wants to 'play' with the Minidac 6010.

"In a few minutes one can get across some otherwise puzzling meanings to curious school administrators. All attempts of explanation without it have failed. The use of your equipment has helped me so very much in my promotion of EDP education . . ."

Myrl L. Curtis
Supervisor, Technical Training
State Board for Vocational Education
Topeka, Kansas

"An excellent teaching device for the hardware and circuitry of computers, and for the organization of logical problems . . ."

Newsletter —
Educational Data Processing

"Minidac 6010 performs an important educational function through its unusual ability to sensitize teachers and students to fundamental computer concepts, particularly in areas of mathematics and logic.

"Minidac is designed to serve an important middle-ground role between traditional mathematics courses and programs for specialized computer training. As an introduction to a new (and vital) subject, the proper utilization of Minidac 6010 and the accompanying text can make a substantial contribution to modern education programs."

Bob Gates
Coordinator, NDEA
Florida State Dept. of Education

THE MINIDAC MANUALS

This, in broad outline, represents the content of the eight comprehensive self-instructional manuals which accompany Minidac 6010:

BOOK I. GETTING ACQUAINTED WITH MINIDAC

A series of basic programs which demonstrate the functions and importance of each section of Minidac. Includes explanation of basic circuitry.

BOOK II. WHAT IS A DIGITAL COMPUTER

The Input, Storage, Processing and Output functions, as shown with Minidac and related commercial equipment. Media and Codes. Digital vs. Analog computers.

BOOK III. HOW COMPUTERS MAKE LOGICAL DECISIONS

Minidac is programmed to teach the basic logic functions of AND, OR, NOT and EXCLUSIVE OR. This leads to an introduction to Boolean Algebra, Decision Making, Logical Problem Solving and Simulation.

BOOK IV. HOW COMPUTERS DO ARITHMETIC

An introduction to the Binary Number System and to devices used in computer arithmetic: The Counter, the Half-Adder, the Full-Adder, the Shift Register and Accumulator. Binary Addition, Subtraction, Multiplication and Division. Binary-to-Decimal Conversion.

BOOK V. HOW COMPUTERS WORK FOR MAN

A detailed discussion with more than 25 programs in which Minidac demonstrates computer applications in business, science and industry: a multiple-floor automatic elevator, automobile speed timer, electronic toll collector, telephone dialing system, machine-sensed numbers, sequential control, machine coding and decoding, automatic message transmission, behavioral simulations, computer programming.

BOOK VI. MINIDAC GAMES

Tic-Tac-Toe, Scissors-Paper-Stone, Electronic Mazes and many others to excitingly illustrate computer logic and problem-solving.

BOOK VII. CAPACITOR/RESISTOR MANUAL

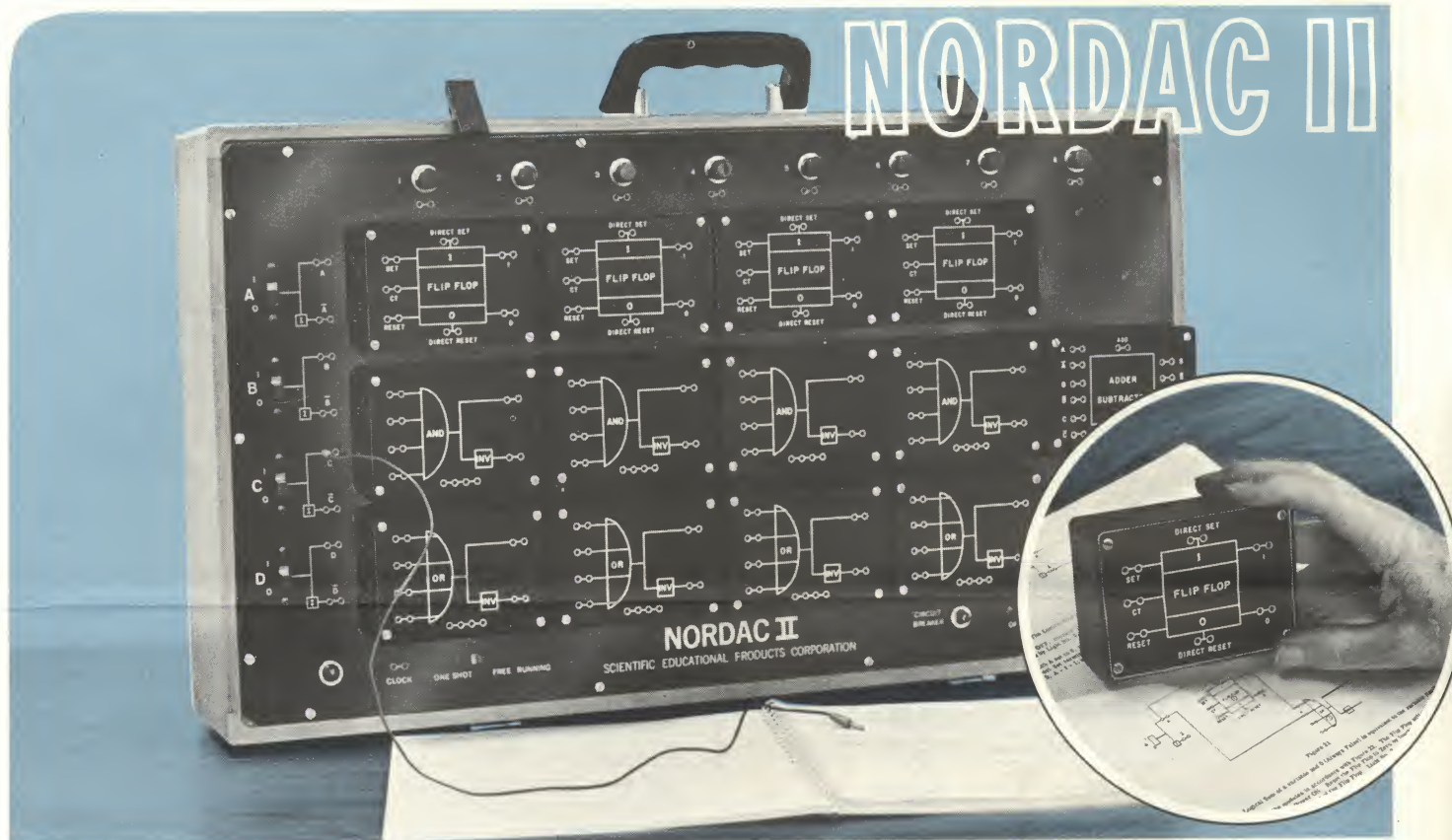
Modifications and improvements in basic circuitry through the use of Minidac's capacitors, resistors and diodes. 24 experiments, including Fast and Delayed Flip Flops, Six-Bit Binary Counter, Automatic Five-Bit Counter, the Accumulator.

BOOK VIII. LOGIC, BOOLEAN ALGEBRA AND DIGITAL COMPUTERS

An expansion of Books II, III and VI, it utilizes logic elements to demonstrate Basic and Advanced Logic; Laws, Postulates and Theorems of Boolean Algebra; Storage, Counters and Registers; Computer Arithmetic, Decision Making and Control. This book parallels the Nordac II manual.

Minidac 6010 comes complete with instructional manuals, program wires, program resistors and diodes. It operates on 105-125 volt, 60 cycle A.C. which is converted into safe 12 volt D.C.

Fully assembled and warranted, Minidac 6010 is \$285.00 Additional sets of manuals are available for \$15.00 per set.



Solid-state logic trainer offers features of most costly training aids.

This remarkable, highly advanced computer logic trainer uses the same building blocks found in full-scale computers, and offers features of some computer training devices costing from \$1000 to \$3000: fully transistorized, pre-wired circuits, with logic symbols the student can easily see — ideal both for classroom demonstration and student use. Yet it is priced at only \$550.00.

There is a type of educator — and you may be one of them — who is seeking for his school the finest digital computer logic trainer on the market.

This man (or woman) is so eager to give his students the best possible computer training that he will make no compromise with quality. Yet he knows that high price *per se* is no guarantee of obtaining the most effective teaching device.

In fact, he recognizes that the ideal equipment is a *highly advanced* training aid at a *moderate price*, to permit a maximum number of students "hands on" experience.

This kind of educator will find Nordac II hard to resist.

For Nordac II comes surprisingly close to a real full-scale computer: it is a "solid state", fully transistorized logic trainer and uses a complete set of basic computer building blocks to perform computer logic, arithmetic, data moving, decision-making and control functions. Put enough Nordac II's together, and you would create an *authentic operating computer!*

ARRAY OF "COSTLY" FEATURES

And as the comparison chart on page three makes plain, despite the fact that Nordac II is priced at only \$550.00, it offers features found on the most expensive logic trainers, products costing two, three or even five times as much: it uses pre-wired circuits and makes the logic diagram plainly visible for every function performed as it quickly and efficiently teaches Logic, Boolean Algebra, Binary Arithmetic — and their application to all computer functions.

Moreover, Nordac II offers important features found on precious few logic trainers at *any* price; it is excellent for *both*

individual student use and classroom demonstration, can teach solid-state computer logic circuits (with an accessory circuit-trainer module) and is the only logic trainer available with a full Adder-Subtractor.

What is the "heart" of Nordac II, its most essential feature? The digital logic module. Nordac II comes with a complete set of the digital logic modules which are the basic building blocks of all full-scale digital computers — AND, OR, INVERTER, FLIP-FLOP — and input, read-out, control and power components.

How are the logic modules made? They are manufactured of solid state components on printed circuit boards, and are contained in large bakelite boxes. A plainly-visible logic symbol, describing the function of the module, is printed on the front of each.

How are teaching demonstrations performed? The student — or teacher — simply plugs the modules called for into the control panel and interconnects them with a few program wires in accordance with the diagrams in the Nordac II text.

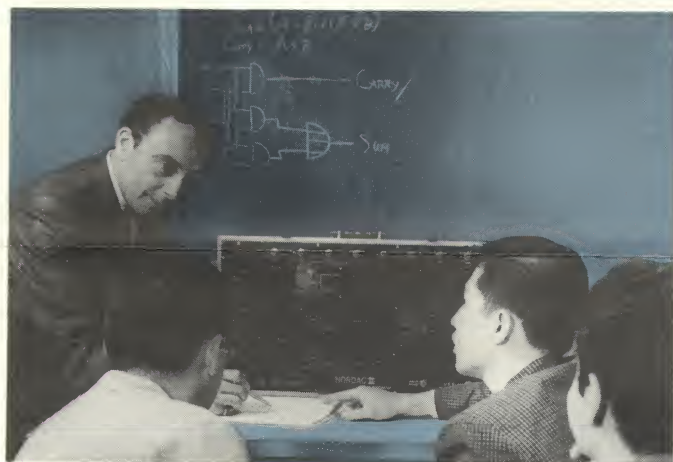
Only the logic modules needed for demonstrating a particular function are used. Therefore the student is not distracted by unused logic blocks, modules and symbols, as with other logic trainers.

What kind of text comes with Nordac II? A lucid, authoritative manual — *Logic, Boolean Algebra and Digital Computer Fundamentals* — prepared by computer education authorities to accompany Nordac II. It contains complete step-by-step instructions for performing over 85 teaching demonstrations, and discusses the meaning and theory behind them.

Will you illustrate how Nordac II works? The Nordac II shown in the photograph below is demonstrating one form of Half-Adder. Note that the arrangement of the symbols on the face of the modules and the interconnections conforms with the logic diagram for the function contained in the portion of the Nordac II text printed below, right.

All teaching demonstrations are arranged so the student always sees the logic diagram of the function on Nordac II. Students readily see (and understand) the computer functions programmed by relating them to standard logic diagrams.

How does Nordac II approach the teaching task? The student



THE NORDAC II TEXT:

Logic, Boolean Algebra and Digital Computer Fundamentals

Chapter I — BASIC LOGIC

Assertion and Negation of Logic Variables. The Logical Connectives OR and AND. Logical Implication. Inhibit. NOR, NAND, EXCLUSIVE OR and EQUIVALENCE. Multi-Level Logic. Gating and Detecting Special Events.

Chapter II — BOOLEAN ALGEBRA

The Postulates of Boolean Algebra. The Commutative, Associative and Distributive Laws. Absorption. De Morgan's Theorems. Simplifying Theorems. NOR-to-AND and NAND-to-OR Conversion.

Chapter III — COMPUTER STORAGE

Storage Elements from Logic Blocks. The Set-Reset FLIP-FLOP.

Chapter IV — COUNTERS AND REGISTERS

The Gated or Steered FLIP-FLOP. The Binary Counter. The Down Counter. The Binary-Coded Decimal Counter. Modulus Three Counters. Decimal-to-Binary and Binary-to-Decimal Conversion. The Ring Counter. The Shift Register. The Storage Register. Between Register Transfer.

Chapter V — COMPUTER ARITHMETIC

Binary Addition. The Half Adder. The Full Adder. Binary Subtraction. The Half Subtractor. The Full Subtractor. The Adder-Subtractor. Parallel Addition. The Accumulator. Serial Addition-Subtraction. Complement Subtraction. True-Complement Arrangement. Complementing a Register. The Binary-Coded-Decimal Complementer.

Chapter VI — COMPUTER DECISION-MAKING

The Comparator. Flip-flop Comparators. Comparator Control.

Chapter VII — COMPUTER CONTROL

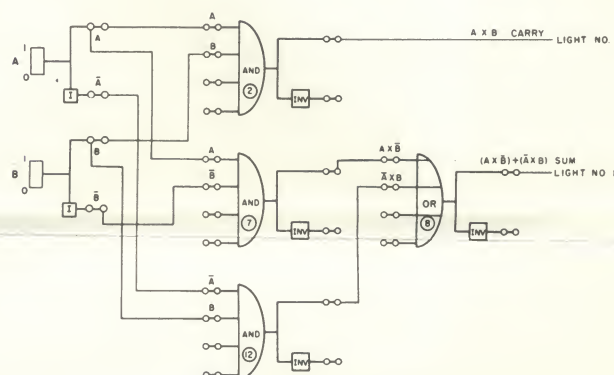
The Recognition Gate. The Step Counter. The Time Pulse Distributor. The Parity Generator. Logical Operations.

is first introduced to the three basic logic operations (AND, OR, NOT), using the same logic blocks which perform these operations in an actual computer.

The student then learns how these basic logic operations are combined into more complex logic expressions, by actually seeing Nordac II perform them.

Next the Postulates, Laws and Theorems of Boolean Algebra are presented. Once again Nordac II is made to perform them, showing the how and why of each.

The logic blocks are then combined to demonstrate and teach computer storage, arithmetic, decision-making and control functions—and how they relate to Logic and Boolean Algebra.



NORDAC II COMPONENTS

Each Nordac II includes these component units:

LOGIC MODULES —Thirteen: 3" x 4" x 1½" each.

FLIP-FLOP: (4) With Direct Set, Direct Reset and Gated Inputs. May be used to make Storage Elements, Binary Counters, Shift Registers.

AND: (4) Logically AND's up to four inputs and provides the True or Inverted Output. When the Inverted Output (INV) is used, it becomes a NAND.

OR: (4) Logically OR's up to four inputs and provides the True or Inverted Output. When the Inverted Output (INV) is used, it becomes a NOR.

ADDER-SUBTRACTOR: (1) Performs Addition (or Subtraction) of two Binary digits and the Carry (or Borrow) from the previous stage. The Output is the Sum (or Difference) and Carry (or Borrow). The selection of the function (Add or Subtract) is controlled electronically.

CONTROL UNIT — Housed in a beautifully-finished hardwood instrument case with cover—14" x 24" x 7". The Control Unit contains:

POWER SUPPLY: 105-125 volt, 60 cycle A.C. Provides proper power to the modules when they are plugged into any of the 15 locations on the Control Panel. Includes On-Off Switch, Power Indicator, Circuit Breaker.

LEVEL SWITCHES: (4) Provide a True or Inverted signal used as logical inputs to the modules.

INDICATORS: (8) Display the output conditions of logic and arithmetic functions.

CLOCK: Provides a single pulse or continuous train of pulses for input and control.

Fully assembled, warranted and complete with manual. Nordac II is \$550.00. For more advanced programs, additional logic modules may be obtained:

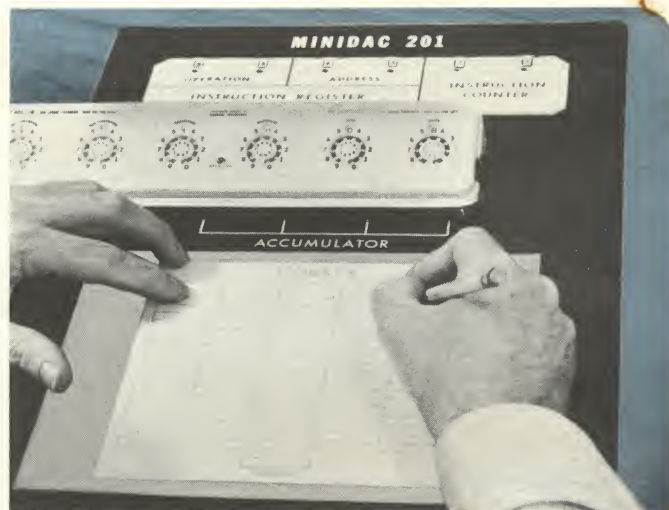
AND/NAND \$20.00 **OR/NOR \$18.00**
FLIP-FLOP \$26.00 **ADDER/SUBTRACTOR \$60.00**

For the study of the solid-state circuits used in computer logic blocks, a Logic Circuit Trainer Module is available. This module is fully compatible with all Nordac II components and is \$65.00.

MINIDAC 201

New low-cost programming trainer gives every student "hands on" experience.

With this ingenious digital computer programming trainer, the student writes programs, loads and executes them just as the largest electronic computer. 100 word memory, 15 basic instructions, instruction register and counter, operating accumulator. For use by every student in classroom, library or home. Only \$16.00.



Once the student has grasped the fundamental concepts and principles of digital computers, with the help of a computer logic trainer, he is ready to apply these principles — that is, to write actual programs, load and execute them to solve problems — with a digital computer programming trainer.

Scientific Educational Products Corporation has developed a new kind of programming trainer — starkly simple, without electronic gadgetry or fancy hardware, but remarkably ingenious and highly effective.

Minidac 201 is a complete, simulated digital computer with which the student learns basic computer programming. It contains all the component parts of the largest digital computer: input, output, memory, instruction register, instruction counter and operating arithmetic accumulator.

As the chart on page three indicates, Minidac 201 actually has every feature or characteristic of programming trainers costing up to \$395.00 — plus greater memory and more instructions — yet it costs only a fraction as much: just \$16.00. And it's just about as light and portable as a textbook.

Thus Minidac 201 is small enough — and inexpensive enough — so every student can have and use one, in the classroom, library, study hall or at home.

How does Minidac 201 compare with a full-scale computer as a training aid? An actual digital computer is expensive and inefficient for teaching basic programming. For this purpose, a simulated computer such as Minidac is ideal. It provides all the component parts of a working computer. The student can see how his programs are executed, just as in the largest computer, but at slow enough speed to allow full comprehension.

How does the student use Minidac 201? He writes programs,

loads and executes them to solve problems. He takes an active part in executing the programs that he has written. By this means he is able to get a complete and sound understanding of computer programming.

Input and Output — how are they accomplished with Minidac 201? By use of special 20-column cards. Each card can contain up to 20 alphanumeric characters (decimal numbers or letters) which can be read into Minidac 201's memory.

How is data stored? In Minidac 201's "scratchpad" memory, in the form of 4 digit words. Up to 100 words can be stored. Each is directly addressable and can contain either instructions or data. Contents of the memory are changed by the student with an ordinary pencil and eraser.

The instruction register, instruction counter and accumulator — how do they work? The instruction register is loaded by the student from memory and automatically decodes the instruction code to tell the student what to do and where. (Operation and Address).

The instruction counter is always set to indicate the address of the next instruction (memory location 00-99).

Minidac 201's accumulator is a 6-decimal digit calculator which will add, subtract and shift; and has an automatic clear mechanism. All arithmetic is performed in the accumulator directly.

Does Minidac 201 have its own manual or text? Yes. The student learns basic computer programming by executing simple programs contained in the Minidac 201 text, to illustrate specific concepts. Then he writes his own programs to solve problems offered in the text, and is asked to load and execute them to prove out his work. The problems presented cover mathematics, business and scientific applications.

MINIDAC 201's INSTRUCTION REPERTOIRE

Code	Mnemonic	Operation
00	HLT	Halt
01	HJP	Halt and Jump to indicated address
10	REA	Read 5 words into memory starting at indicated address
20	PRT	Print 5 words from memory beginning at indicated address
30	LOA	Load Accumulator with contents of indicated address
40	STA	Store contents of Accumulator into indicated address
50	ADD	Add contents of indicated address into Accumulator
60	SUB	Subtract contents of indicated address from Accumulator
70	COM	Compare data in Accumulator to data in indicated address
82	JMP	Unconditionally jump to instruction in indicated address
83	JIE	Jump to instruction in indicated address if Accumulator Equal
84	JIL	Jump to instruction in indicated address if Accumulator Larger
85	JOV	Jump to instruction in indicated address if Accumulator Overflow
96	SHR	Shift right number of places indicated
97	SHL	Shift left number of places indicated

MINIDAC 201 WORD FORMAT

Numeric Word	Sign	Digit	Digit	Digit
Alphabetic	Letter	Letter	Letter	Letter
Instruction	Operation		Address	

Minidac 201 Computer Programming Trainer, complete with self-instructional manual, is \$16.00.

HOW TO ORDER

Minidac 6010, Nordac II and Minidac 201 are available only directly from Scientific Educational Products Corporation.*

All shipments are made FOB Riverside, New Jersey. Terms are Net 30 Days. Prices and specifications subject to change without notice.

SCIENTIFIC EDUCATIONAL PRODUCTS CORPORATION
30 East 42nd Street • New York, N. Y. 10017

*Recognizing the importance of educational devices, the Federal Government has made funds available under Title III and VIII of NDEA, as well as ESEA and other acts for the purchase of equipment for use in teaching science, mathematics, and vocational and technical courses. You may be able to obtain funds under these programs through your State Department of Education, to cover all or part of the purchase price of Minidac 6010, Nordac II or Minidac 201. For further information, contact your state NDEA representative.